

## CLAIMS

1. A direct-current power supply comprising:

a DC-DC converter, by its switching operation, converting an input voltage applied from an external  
5 direct-current power supply into an output voltage equal to or higher than the input voltage, and applying the output voltage to an external load;

a converter control section comparing said output voltage with a desired voltage, and, based on their  
10 difference, controlling said switching operation of said DC-DC converter;

a bypass switch shorting between the input and output of said DC-DC converter; and

a bypass control section maintaining said bypass  
15 switch in the ON state during non-operation of said DC-DC converter, and at a start of said switching operation of said DC-DC converter, further maintaining said bypass switch in the ON state for a predetermined time from the start.

20 2. The direct-current power supply according to claim 1 wherein:

said bypass control section compares said input voltage with said output voltage, and turns on and off said bypass switch when said input voltage is higher and lower  
25 than said output voltage, respectively.

3. The direct-current power supply according to claim 1 wherein:

said direct-current power supply comprises a start control section sending a predetermined start signal to said converter control section based on one or both of said input and output voltages;

said converter control section in non-operation starts upon receipt of said start signal; and

said bypass control section includes:

10 a signal delay section holding said start signal for a predetermined delay time from the instant of the receipt, and

a switch driving section maintaining said bypass switch in the ON state until the receipt of said start signal from said signal delay section, and turning off said bypass switch at the receipt of said start signal.

4. The direct-current power supply according to claim 3 wherein:

20 said start control section sends a predetermined stop signal to said converter control section, based on said input voltage;

said converter control section in operation stops upon the receipt of said stop signal; and

25 in said bypass control section,

said signal delay section holds said stop signal for a predetermined delay time from the instant of the receipt, and

5       said switch driving section maintains said bypass switch in the OFF state until the receipt of said stop signal from said signal delay section, and turning on said bypass switch at the receipt of said stop signal.

5.     The direct-current power supply according to claim  
10     1 wherein:

      said direct-current power supply comprises an input voltage detecting section comparing said input voltage with a start input voltage;

      said converter control section, based on the output  
15     of said input voltage detecting section,

      maintains said DC-DC converter in non-operation during the period when said input voltage is higher than said start input voltage, and

      causes said DC-DC converter to start said  
20     switching operation at the detection of the fall of said input voltage to said start input voltage.

6.     The direct-current power supply according to claim  
1     comprises:

      an input voltage detecting section comparing said  
25     input voltage with a stop input voltage;

an output voltage detecting section comparing said output voltage with a start output voltage; and

a start control section,

based on the output of said output voltage detecting section, maintaining said converter control section in non-operation during the period when said output voltage is higher than said start output voltage, and causing said converter control section to start at the detection of the fall of said output voltage to said start output voltage, and

based on the output of said input voltage detecting section, maintaining said converter control section in operation during the period when said input voltage is lower than said stop input voltage, and causing said converter control section to stop at the detection of the rise of said input voltage to said stop input voltage.

7. The direct-current power supply according to claim 6 wherein:

said start control section, based on the outputs of said input voltage detecting section and said output voltage detecting section,

maintains said converter control section in non-operation during the period when said input voltage is higher than said stop input voltage and

said output voltage is higher than said start output voltage, and

causes said converter control section to start when said input voltage falls below said stop input voltage and the fall of said output voltage to said start output voltage is detected.

8. The direct-current power supply according to claim 1 wherein:

said DC-DC converter has the ability of buck operation converting said input voltage into said output voltage equal to or lower than the input voltage, in addition to the ability of boost operation converting said input voltage into said output voltage equal to or higher than the input voltage;

said converter control section, based on the difference between said output voltage and said desired voltage, causes said DC-DC converter to perform one of said buck operation and said boost operation, and maintains said DC-DC converter in non-operation; and

at the start of the boost operation of said DC-DC converter, said bypass control section further maintains said bypass switch in the ON state for a predetermined time from the instant of the start.

9. The direct-current power supply according to claim 1 comprising a synchronous rectifier section performing

rectification during operation of said DC-DC converter in synchronization with its switching operation, and maintaining the ON state during non-operation of said DC-DC converter.

5 10. The direct-current power supply according to claim 8 comprising a synchronous rectifier section performing rectification during boost operation of said DC-DC converter in synchronization with its switching operation, and maintaining the ON state during non-operation of said  
10 DC-DC converter.

11. The direct-current power supply according to claim 8 comprising a stop switch operated under an on-off control of said external load and cutting off one of an input current provided from said external direct-current power  
15 supply and an output current provided for said external load.

12. The direct-current power supply according to claim 11 wherein:

said DC-DC converter includes an output smoothing  
20 capacitor connected in parallel with said external load;

a node near said external load between said DC-DC converter and said bypass switch locates a position nearer said external direct-current power supply than said output smoothing capacitor; and

said stop switch is connected between said node and said output smoothing capacitor.

13. The direct-current power supply according to claim 11 wherein said stop switch is connected at a position  
5 nearer said external direct-current power supply than a node near said external direct-current power supply between said DC-DC converter and said bypass switch.

14. A battery-powered electronic apparatus comprising:  
a battery supplying a predetermined battery voltage;

10 and

a direct-current power supply comprising:

a DC-DC converter, by its switching operation, converting said battery voltage into an output voltage equal to or higher than the battery voltage;

15 a converter control section comparing said output voltage with a desired voltage, and, based on their difference, controlling said switching operation of said DC-DC converter;

a bypass switch shorting between the input and  
20 output of said DC-DC converter; and

a bypass control section maintaining said bypass switch in the ON state during non-operation of said DC-DC converter, and at a start of said switching operation of said DC-DC converter, further  
25 maintaining said bypass switch in the ON state for

a predetermined time from the start.

15. The battery-powered electronic apparatus according to claim 14 wherein said battery voltage falls below said desired voltage in the middle of discharge of said battery.

5 16. The battery-powered electronic apparatus according to claim 14 comprising a wireless transmitter section sending a signal by radio waves to the outside.

17. The battery-powered electronic apparatus according to claim 16 wherein said wireless transmitter section  
10 includes a power amplifier section amplifying a signal to be sent under the application of said output voltage of said DC-DC converter.